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US Army Corps  
of Engineers

The Hydrologic  
Engineering Center

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STATISTICAL ANALYSIS OF TIME SERIES DATA  
(STATS)



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Users Manual (Preliminary)

May 1987

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<b>16. Abstract (Limit: 200 words)</b>  The computer program STATS is designed to reduce large volumes of daily or monthly data to a few meaningful statistics or curves. The program will perform the following analyses: (1) duration curves, (2) annual maximum events, (3) annual minimum events, (4) departures of monthly and annual values from respective means, and (5) annual volume-duration of high and low events.				
 The daily or monthly data to be used as input to this program can follow in the data file or the data can be accessed through HEC's Data Storage System (DSS). This latter capability provides for the analysis of output from other HEC programs like HEC5. The frequency analysis may be analytical for data that tends to follow a theoretical distribution, e.g. annual maximum daily flows; or graphical for those data that do not tend to follow any known distribution, e.g. regulated flows. The input data may be transformed to logarithms for the statistical analyses, if so desired. <i>Keywords:</i>  <i>input program documentation. (kp)</i>				
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INPUT DESCRIPTION

STATISTICAL ANALYSIS OF TIME SERIES DATA

(STATS)

TI Record - TITLE INFORMATION

<u>Field</u>	<u>Variable</u>	<u>Value</u>	<u>Description</u>
0	ICD	TI	Record identifier.
1-10	TITLE	Alpha	Alphanumeric information to identify the job. As many TI records may be provided as necessary to input the desired descriptive information. Only the first three records are retained for labeling output tables.

J1 Record - JOB SPECIFICATIONS (optional record)

<u>Field</u>	<u>Variable</u>	<u>Value</u>	<u>Description</u>
0	ICD	J1	Record identifier.
1	JSTAT (3)	+	Statistical analysis options. The sum of the following options will govern kind of statistical analyses that are performed on the time series data. If blank the default is 3, activating analysis options 1 and 2.
		1	Graphical frequency analysis of annual events.
		2	Analytical frequency analysis of annual events.
		4	Duration analysis, CL record must be provided.
		8	Monthly means of data by year and statistics of monthly and annual means. Statistics include the mean, standard deviation, skew, maximum and minimum.
		16	Departures of monthly and annual values from respective means.
		32	Volume-duration analysis of daily values. Durations of 1, 3, 7, 15, 30, 60, 90, 120, and 183 days are presently used.

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J1 record (continued)

<u>Field</u>	<u>Variable</u>	<u>Value</u>	<u>Description</u>
2	NPRDS (365)	+	Nominal number of periods in each event, e.g., 365 if daily data and the event is a year, or 12 if monthly data.
3	NYRS	+	Number of years represented by the events. May be left blank if NYRS is equal to the number of input events.
4	MONWY (1)	+	Month order number of the first period in each event, e.g. 1 for JAN, 10 for OCT, etc. This value is used to specify the water year. If blank, 1 is assumed.
5	JBEGN (1)	+	Order number of first period in each event to select for analysis. If blank, period 1 is assumed. JBEGN and JEND are used to select a specific set of sequential periods from each event.
6	JEND (NPRDS)	+	Order number of last period in time series to select for analysis. If blank, the last period is assumed.
7	JPPF (2)		Plotting position formula option.
		1	Weibull plotting positions.
		2	Median (Beard) plotting positions, default value.
		3	Hazen plotting positions.
8	MONSS (0)		Suppress printout of selected statistics of monthly means. Sum the following desired codes:
		0	No statistics printout suppression.
		1	Suppress printout of the maximums.
		2	Suppress printout of the minimums.
		4	Suppress printout of the mean.

J1 record (continued)

<u>Field</u>	<u>Variable</u>	<u>Value</u>	<u>Description</u>
8	MONSS		(continued)
<b>Note - The following statistics of the logs may be suppressed if LOGTM = 1 (J1.9):</b>			
		8	Suppress printout of the mean of the logs.
		16	Suppress printout of the standard deviation.
		32	Suppress printout of the skew coefficient.
9	LOGTM (0)		Logarithmic transformation indicator for statistics of the monthly means.
		-1	Use same transformation as LOGT (LS.3).
		0	No transformation.
		1	Log (base 10) transformation.
10	NDECM (0)		Number of decimal places for table of monthly means.
		-1	Use same number as NDEC (LS.4).
		+	0, 1, 2, or 3 allowed. If LOGTM (J1.9) specifies a log transform, the mean, standard deviation, and skew will be printed with 4 decimal places.

ID record - LOCATION IDENTIFICATION (required record)

<u>Field</u>	<u>Variable</u>	<u>Value</u>	<u>Description</u>
0	ICD	ID	Record identifier.
1-10	LOCID	Alpha	Alphanumeric information such as location identification, station number, etc. Although columns 3-80 may be used, only columns 3-48 are printed as table headings.

**LS record - LOCATION SPECIFICATIONS (optional record)**

<b>Field</b>	<b>Variable</b>	<b>Value</b>	<b>Description</b>
0	ICD	LS	Record identifier.
1	IANAL (3)		Data selection option for frequency analysis specified by JSTAT (J1.1).
		1	Analyze the maximum values selected from each event.
		2	Analyze the minimum values selected from each event.
		3	Analyze both maximum and minimum values from each event.
		4	All data in each event will be analyzed. (not programmed yet).
2	VNAME (FLOW,CFS)	Alpha	Variable name and/or units to be used for table and graph headings.
3	LOGT (1)		Logarithmic transformation indicator for frequency analyses.
		-1	No transformation.
		0,1	Log (base 10) transform.
4	NDEC (0)	+	Number of decimal places to print in tables of plotting positions and frequency curve ordinates; 0, 1, 2, or 3 allowed.
5	NSIG (3)		Number of significant figures in printout of computed frequency curve ordinates.
		-1	No rounding will be done.
		0	Round to three (3) significant figures, default.
		+	Round values to NSIG significant figures.

**LS record (continued)**

<u>Field</u>	<u>Variable</u>	<u>Value</u>	<u>Description</u>
6	IPRNT (0)	+	The sum of the following printout suppression options will control the amount of output and diagnostic information.
		0	Standard output will not be suppressed and no diagnostic information will be output.
		1	Suppress listing of the input time series data.
		2	Suppress printout of plotting position table.
		4	Suppress printout of frequency curve ordinates.
		8	Suppress printout of frequency statistics.
		16	Suppress frequency curve printer plots.
		32	Not used.
		64	Write duration curve ordinates to a file in computer program HYDUR format.
		128	Provide diagnostic output at various steps of interpolation for frequency curve ordinates.

**FR record - INPUT EXCEEDANCE FREQUENCIES (optional record)**

This optional record specifies percent chance exceedance (exceedance frequency) values other than the following 12 default values:  
0.2, 0.5, 1, 2, 5, 10, 20, 50, 80, 90, 95, and 99.

<u>Field</u>	<u>Variable</u>	<u>Value</u>	<u>Description</u>
0	ICD	FR	Record identifier.
1	--	--	Not used.
2	NFRQ (12)	+	Number of percent chance exceedance values for which to compute frequency curve ordinates. Dimensioned for a maximum of 18 values.
3-10	FREQ (see above)	+	Percent chance exceedance values. If there are more than 8 values, the 9th value must be in the first field of the second FR record.

**SC record - SPECIFIED COORDINATES (optional record)**

This record may be used to control the extrapolation at either or both ends of a graphical frequency curve. These specified points will be used in the polynomial curve fitting routines that estimate magnitudes of events for frequencies from the FR record that are beyond those of the input data (plotting positions).

<u>Field</u>	<u>Variable</u>	<u>Value</u>	<u>Description</u>
0	ICD	SC	Record identifier.
1	NSCV (0)	+	Number of pairs of specified coordinates. Dimensioned for 4.
2	XSC	+	Percent chance exceedance for the first coordinate.
3	YSC	+	Corresponding value of the response variable, for example the flow or stage corresponding to the percent chance exceedance XSC.
4-9	XSC,YSC	+	Remaining pairs of data.
10	--	--	Not used.

**CL record - CLASS LIMITS FOR DURATION ANALYSIS (optional record)**

This record specifies the number of classes and the lower limit for each class. Default values are not yet available.

<u>Field</u>	<u>Variable</u>	<u>Value</u>	<u>Description</u>
0	ICD	CL	Record identifier.
1	NCLV	+	Number of class limit values. Dimensioned for 59.
2	CLV	+	The lowest value (class limit) to be included in class 1. Smaller values will be assigned to class zero (0).
3-10	CLV	+	Repeat as required by NCLV. If there are more than 9 values, the 10th value will begin in the first field of the next record.

**RV record - REVISION OF INPUT DATA (optional record)**

This record is used to modify a set of data by the addition or multiplication of the specified constant.

<u>Field</u>	<u>Variable</u>	<u>Value</u>	<u>Description</u>
0	ICD	RV	Record identifier.
1	IFUNC		Mathematical operation to perform on data.
		1	Add the quantity CONST (RV.2) to each data value.
		2	Multiply the quantity CONST (RV.2) by each data value.
2	CONST	+	The value which will be used in the operations specifies by IFUNC (RV.1).

**ZR record - DSS READ PATHNAME (optional record)**

This record specifies the pathname for data to be acquired from the Data Storage System (DSS). The program will create "IN" records to be processed by the analysis portion of the program.

<u>Field</u>	<u>Variable</u>	<u>Value</u>	<u>Description</u>
0	ICD	ZR	Record identifier.
1-10	(pathname)	Alpha	Alphanumeric pathname of file as generated by DSS. Use the following format beginning in column 3:  A-PROJECT B-LOCATION C-PARAMETER, ETC.

Pathname parts A - E must be specified on the first ZR record. Subsequent ZR records need only provide those pathname parts that are different.

**ZT record - DSS TIME AND DATES (optional record)**

This record is used to specify the starting and ending times and dates for the data to be acquired from DSS. This record must be provided after the first ZR record only and all times and dates remain fixed until a EJ record is encountered.

<u>Field</u>	<u>Variable</u>	<u>Value</u>	<u>Description</u>
0	ICD	ZT	Record identifier.
1	ITIMST	+	Starting time in hours and minutes in 24-hour time, e.g. 1305 for 5 minutes after 1 pm. Use zero (0) for daily, monthly, or annual data.
2-3	IDATST	Alpha	Starting date for analysis in military style, e.g. 01JAN1933. Locate within columns 13 to 24, must be left justified.
4	ITIMEN	+	Ending time in minutes (24-hour time).
5-6	IDATEN	Alpha	Ending date for analysis in military style. Locate within columns 37-48, must be left justified.

**ZW record - DSS WRITE PATHNAME (optional record)**

This record specifies the pathname in which to write frequency and duration curve ordinates (as requested by J1.1). A ZW record must be provided at each location for which frequency and duration relationships are to be written to a DSS file. (Currently volume-duration relationships can not be written to DSS.)

<u>Field</u>	<u>Variable</u>	<u>Value</u>	<u>Description</u>
0	ICD	ZW	Record identifier.
1-10	(pathname)	Alpha	Alphanumeric pathname to be assigned to curves written to a DSS file. Parts A, B, C, E, and F in free format in columns 3-80 separated by space or comma. Each pathname part may not exceed 32 characters.  A - Project or Basin; i.e., OHIO RIVER.  B - Location; i.e., CINCINNATI.  C - Curve parameters. This part contains the two parameter names for the data. Valid parameters are FREQ-FLOW, FREQ-ELEV, etc. (These labels are used by the program to assign units to parameters; therefore, alternative labels should not be assigned.)

ZW record (continued)

<u>Field</u>	<u>Variable</u>	<u>Value</u>	<u>Description</u>
1-10	(pathname)		(continued)
D is assigned by the program to various output as follows:			
a. For frequency curve analysis output;			
MAX (or MIN) EVENTS - Ordinates for frequency curve based on plotting positions. Values may be from an analysis of maximum annual events (MAX) or minimum annual events (MIN).			
MAX (or MIN) COMPUTED - Ordinates for frequency curve based on evaluation of statistics computed from the data.			
MAX (or MIN) EXPECTED - Ordinates for frequency curve based on computed statistics and expected probability adjustment.			
MAX (or MIN) 5 (or 95) PER CONF LIMIT - Ordinates for the 5 (or 95) percent chance exceedance confidence limit curves around the computed frequency curve.			
b. For duration curve analysis output;			
FLOW-DUR DATA - Ordinates for duration curve based on class limits and computed percent of time equalled or exceeded.			
INTERPOLATED FLOW-DUR - Ordinates for duration curve based on even percentages with magnitudes interpolated between computed values.			
E - Time Descriptor for data (usually not needed for paired data output by STATS).			
F - Unique descriptor to identify the conditions, operation plan, projects assumed in place, etc; i.e., INFLOW, OUTLLOW, NATURAL, REGULATED, OUTFLOW W/ PLAN B, etc.			
Example ZW record: ZW A-OHIO,B-CINCINNATI,C-FREQ-FLOW,F-OBSERVED W/ REGULATION			

**BF record - BEFORE DATA (optional record)**

This record is used to specify a input data format that is different than the default format and/or a variable number of periods in each event.

<u>Field</u>	<u>Variable</u>	<u>Value</u>	<u>Description</u>
0	ICD	BF	Record identifier.
1	IFMT (1)	0	Not programmed yet.
		1	Data will be input with 12 values on each record (useful for monthly data). Columns 3-6 are for an optional integer location number, columns 7-8 are for the last two digits of the year, and columns 9-80 are for 12 data values in each 6 column field.
		2	Data will be input with the first "IN" record containing an integer location number in columns 3-8 and the starting year in columns 13-16. The data will follow on successive "IN" records in 10 fields of 8 columns each.
		3	This format is generated by the program when the data read from DSS are monthly values.
		4	This format is generated by the program when the data read from DSS are daily values.
2	NPRDS	+	Actual number of periods for the event following on "IN" records until the next ID, BF, or EJ record.

**IN record - TIME SERIES DATA (required record unless data acquired from DSS)**

These records are used to input the time series information. If the data are input via DSS, these records will be generated by the program.

(Note - See BF record description for format of IN records.)

**EJ record - END OF JOB INDICATOR (required between jobs)**

An EJ record should be provided between time series data (jobs) at different locations when different job specifications (J1) are applicable. Otherwise, one EJ record at the very end is sufficient.

LISTING OF TEST DATA (INPUT)

TT TEST NO. 1 -- STATISTICAL ANALYSIS OF TIME SERIES DATA  
 TT ANALYTICAL ANALYSIS OF MONTHLY FLOWS  
 TT COMPUTE DURATION CURVE ALONG WITH MAXIMUM AND MINIMUM ANALYSIS  
 TT COMPUTE STATISTICS OF LOGS FOR MONTHLY SUMMARY TABLES  
 TT INPUT LISTING OF DAILY DATA SUPPRESSED

J1 10 12 -1

ID WINNIBIGOSHISH RESERVOIR INFLOW

LS 3FLOW,CFS

IN	130	212	483	356	498	924	484	186	464	509	337	278	234
IN	131	166	224	308	267	305	122	149	107	26	137	168	236
IN	132	263	289	273	425	906	289	155	101	209	138	361	295
IN	133	304	299	309	465	857	207	289	302	156	46	188	152
IN	134	161	146	187	224	189	184	178	244	95	32	104	144
IN	135	176	109	92	552	436	525	670	15	24	181	207	240
IN	136	189	181	370	509	899	259	282	253	65	206	76	1200
IN	137	198	296	318	682	907	476	205	141	1365	553	413	220
IN	138	258	235	227	815	2438	1496	177	467	48	44	272	175
IN	139	261	162	218	605	348	614	229	65	239	118	72	131

EJ

TT TEST NO. 2 -- STATISTICAL ANALYSIS OF TIME SERIES DATA  
 TT GRAPHICAL ANALYSIS OF MONTHLY RESERVOIR ELEVATIONS  
 TT ONLY MONTHS OF MAY THRU SEPT USED IN ANALYSIS  
 TT PRINTOUT SIX SIGNIFICANT FIGURES WITH TWO DECIMAL PLACES  
 TT RV CARD USED TO ADD 1290 FEET TO INPUT VALUES  
 TT LOG TRANSFORM AND FREQUENCY CURVE PLOT SUPPRESSED

J1 9 12 0 1 5 9 -1

ID WINNIBIGOSHISH RESERVOIR ELEVATION, 1290 FEET ADDED TO INPUT

LS 3STAGE,FT -1 2 6 16

RV 1 1290

130	7.19	7.07	6.94	7.13	7.71	8.27	8.30	7.06	6.12	6.43	6.62	6.77
131	6.87	6.92	6.94	7.01	7.18	7.29	7.18	6.96	6.80	6.76	6.80	6.90
132	7.05	7.03	6.94	7.09	7.53	8.10	8.07	7.73	7.09	6.57	6.57	5.87
133	5.05	5.05	5.05	5.36	5.97	6.39	6.25	5.85	5.29	4.94	4.94	4.94
134	4.94	4.94	4.99	5.10	5.22	5.31	5.20	4.89	4.65	4.56	4.58	4.66
135	4.78	4.88	4.92	5.18	5.60	6.01	6.48	6.71	6.61	6.59	6.68	6.80

EJ

TT TEST NO. 3 -- STATISTICAL ANALYSIS OF TIME SERIES DATA  
 TT ANALYTICAL ANALYSIS OF DAILY FLOWS  
 TT COMPUTE DURATION CURVE ALONG WITH MAXIMUM AND MINIMUM ANALYSIS  
 TT COMPUTE STATISTICS OF LOGS FOR MONTHLY SUMMARY TABLES  
 TT INPUT LISTING OF DAILY DATA SUPPRESSED

TT TEST OF 5 YEARS 1922-26

J1 14 365 1 -1

ID KAW LAKE INFLOWS

LS 3FLOW,CFS 1

CL	29	100	200	300	400	500	600	700	800	900
CL	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000
CL	20000	30000	40000	50000	60000	70000	80000	90000	100000	200000

BF 2 365

IN 1 1922

IN	105.	202.	105.	87.	92.	100.	83.	139.	275.	127.
IN	102.	105.	110.	115.	164.	251.	140.	129.	170.	154.
IN	174.	180.	169.	155.	140.	119.	101.	97.	92.	88.
IN	95.	104.	108.	138.	141.	117.	107.	119.	144.	102.
IN	92.	95.	98.	87.	169.	318.	132.	95.	87.	116.
IN	186.	196.	261.	308.	428.	655.	645.	503.	398.	283.
IN	202.	270.	343.	352.	236.	353.	555.	546.	553.	532.
IN	533.	574.	1816.	6473.	12889.	14759.	9175.	5418.	3641.	2656.
IN	2110.	1809.	1796.	2067.	2546.	2168.	1679.	1385.	1236.	1146.
IN	1078.	1233.	4318.	5954.	5097.	3755.	8090.	26926.	29164.	27903.
IN	27845.	15308.	6453.	3687.	2932.	2603.	2415.	2217.	2046.	1875.
IN	1764.	1683.	1708.	2054.	2777.	3286.	4562.	5640.	5826.	5067.
IN	5725.	10923.	12719.	10292.	6889.	4270.	4343.	11152.	12461.	11097.
IN	8718.	6448.	5108.	3987.	3324.	2946.	2694.	2456.	2305.	3593.
IN	6646.	15578.	16726.	12131.	8167.	5443.	3864.	3712.	6079.	8108.
IN	6981.	4643.	3008.	2308.	2074.	1860.	1803.	1667.	1591.	1544.
IN	1478.	1410.	1348.	1290.	1245.	1168.	1133.	1173.	1179.	1198.
IN	1092.	983.	958.	925.	911.	1010.	1158.	1186.	1451.	1783.
IN	1630.	1629.	1916.	2135.	2134.	1841.	1581.	1338.	1169.	1088.
IN	15662.	29642.	47437.	46374.	29983.	11055.	5540.	7502.	20222.	23803.
IN	13947.	7641.	4795.	3550.	2842.	2501.	2237.	2013.	1789.	1654.

IN 1510.	1421.	1345.	1317.	1334.	1334.	1236.	1150.	1125.	1142.
IN 1226.	1339.	1262.	1135.	1054.	978.	958.	908.	826.	794.
IN 820.	878.	863.	735.	645.	588.	576.	577.	529.	506.
IN 486.	473.	463.	433.	420.	411.	385.	366.	352.	336.
IN 338.	468.	788.	678.	628.	518.	439.	410.	393.	378.
IN 360.	365.	378.	378.	372.	368.	361.	343.	333.	333.
IN 328.	331.	352.	430.	416.	393.	358.	343.	340.	344.
IN 343.	331.	311.	296.	294.	291.	289.	286.	291.	291.
IN 308.	335.	340.	309.	298.	298.	306.	306.	306.	306.
IN 304.	300.	311.	604.	1741.	2918.	2211.	1266.	927.	848.
IN 795.	721.	673.	587.	767.	6135.	8154.	8138.	5675.	3378.
IN 2421.	1925.	1629.	1377.	1233.	1133.	1059.	992.	932.	902.
IN 863.	838.	804.	775.	756.	741.	735.	744.	729.	702.
IN 725.	723.	688.	672.	668.	615.	545.	559.	534.	520.
IN 489.	458.	473.	526.	596.	591.	580.	604.	679.	749.
IN 701.	585.	488.	407.	314.					
BF 2	365								
IN 1	1923								
IN 525.	561.	571.	489.	280.	236.	184.	152.	144.	142.
IN 135.	133.	133.	126.	144.	150.	126.	113.	118.	123.
IN 113.	123.	129.	108.	108.	116.	117.	108.	119.	136.
IN 147.	134.	113.	137.	205.	132.	126.	135.	134.	112.
IN 108.	108.	115.	130.	142.	122.	115.	105.	95.	105.
IN 110.	105.	123.	123.	113.	97.	105.	118.	113.	115.
IN 115.	122.	108.	93.	102.	105.	102.	102.	100.	147.
IN 289.	411.	435.	404.	358.	360.	405.	305.	256.	201.
IN 175.	162.	159.	137.	137.	132.	107.	100.	97.	95.
IN 92.	112.	26.	73.	536.	882.	597.	407.	263.	187.
IN 135.	122.	120.	186.	333.	184.	152.	125.	119.	123.
IN 117.	105.	150.	208.	217.	210.	301.	716.	1014.	426.
IN 426.	426.	426.	426.	426.	426.	426.	426.	426.	317.
IN 465.	416.	386.	398.	404.	370.	377.	375.	338.	423.
IN 3253.	6228.	7307.	11196.	15403.	14867.	9580.	5064.	4557.	5182.
IN 6737.	7366.	7693.	9012.	8414.	6779.	10541.	13392.	35711.	57284.
IN 110960.	92060.	68237.	50901.	33382.	32253.	49135.	47700.	35232.	24110.
IN 14306.	10476.	8870.	8320.	7121.	6290.	6109.	5826.	4423.	3970.
IN 3596.	3248.	2909.	2894.	3222.	3819.	3770.	3120.	2609.	2324.
IN 2127.	2015.	1963.	1892.	1952.	2125.	2190.	2274.	2494.	2585.
IN 2328.	1968.	1754.	1702.	1711.	1891.	2266.	2260.	2098.	2017.
IN 1973.	1834.	1715.	1686.	1713.	1917.	1760.	1637.	1586.	1497.
IN 1457.	1595.	1884.	1823.	1776.	1856.	2005.	2105.	2008.	1978.
IN 2077.	2478.	2371.	2800.	4123.	3978.	3671.	3559.	4644.	5730.
IN 5898.	5059.	4368.	3796.	3528.	3460.	3422.	3092.	2822.	2543.
IN 2332.	2121.	1961.	1833.	1793.	1802.	1762.	1642.	1601.	1589.
IN 1764.	2201.	2664.	2618.	2305.	2217.	2684.	3029.	2788.	1767.
IN 1014.	4255.	6127.	4696.	3816.	2989.	2781.	2482.	2322.	2217.
IN 2103.	2101.	2100.	2396.	4486.	6899.	10527.	11002.	8044.	6120.
IN 4948.	4207.	3769.	3445.	3192.	3031.	2884.	2759.	2675.	2600.
IN 2484.	3232.	5544.	6331.	5076.	3973.	3649.	3676.	3691.	3409.
IN 3108.	2903.	2777.	2667.	2559.	2506.	2425.	2415.	2377.	2279.
IN 2191.	2165.	2150.	2050.	2010.	1964.	1914.	1846.	1806.	1729.
IN 1682.	1616.	1606.	1604.	1616.	1616.	1633.	1633.	1574.	1548.
IN 1548.	1540.	1511.	1462.	1444.	1495.	1702.	1853.	1852.	1706.
IN 1610.	1514.	1487.	1478.	1470.	1429.	1451.	1411.	1482.	1624.
IN 1683.	1653.	1675.	1597.	1435.					
BF 2	366								
IN 1	1924								
IN 1175.	979.	942.	888.	672.	711.	852.	1020.	1090.	1089.
IN 1117.	1076.	1023.	1037.	1037.	1037.	1021.	866.	866.	961.
IN 965.	1019.	1095.	1064.	1062.	1063.	1093.	1142.	1271.	1479.
IN 1605.	1592.	1652.	1761.	1970.	2150.	1943.	1714.	1416.	1296.
IN 1384.	1541.	2243.	3304.	3117.	2713.	2533.	2408.	2350.	2245.
IN 2118.	2042.	2085.	2107.	2130.	1990.	1861.	1752.	1823.	1754.
IN 1705.	1728.	1688.	1689.	1722.	1728.	1632.	1556.	1550.	1458.
IN 1451.	1835.	2381.	2192.	2361.	3467.	4365.	4158.	4302.	4404.
IN 4612.	4627.	4502.	4371.	4186.	4215.	4302.	5039.	6329.	5953.
IN 4935.	4154.	3730.	3333.	3182.	3150.	3160.	2998.	2845.	2640.
IN 2497.	2363.	2255.	2186.	2218.	2168.	2140.	2124.	2088.	2011.
IN 1986.	1976.	1950.	1911.	2912.	8253.	11509.	8729.	3763.	7456.
IN 16045.	24276.	21560.	12184.	10022.	6968.	5113.	4234.	3631.	3322.
IN 3105.	2911.	2638.	2480.	2347.	2227.	2112.	1997.	1902.	1858.
IN 1770.	1676.	1591.	1573.	1615.	1726.	1733.	1810.	1849.	1883.

IN	1845.	1744.	1840.	1923.	1936.	1848.	1748.	1673.	1559.	1498.
IN	1432.	1430.	1395.	1305.	1214.	1139.	1073.	1047.	951.	873.
IN	791.	765.	805.	878.	888.	781.	691.	676.	627.	595.
IN	610.	546.	533.	527.	524.	529.	501.	469.	418.	395.
IN	425.	430.	474.	491.	437.	826.	1296.	1973.	2024.	1845.
IN	1777.	1560.	1335.	1412.	1357.	1054.	835.	736.	667.	593.
IN	564.	520.	510.	500.	485.	476.	271.	451.	5068.	5682.
IN	2605.	1070.	1021.	1609.	1767.	1239.	1041.	915.	774.	658.
IN	587.	539.	473.	430.	430.	436.	499.	381.	370.	349.
IN	344.	357.	357.	339.	309.	280.	281.	274.	278.	277.
IN	265.	221.	190.	181.	193.	224.	207.	206.	207.	204.
IN	192.	325.	1060.	1137.	611.	404.	354.	321.	291.	292.
IN	322.	275.	255.	251.	231.	218.	215.	210.	219.	281.
IN	510.	757.	934.	990.	855.	685.	550.	469.	409.	392.
IN	380.	362.	324.	310.	315.	309.	304.	290.	298.	293.
IN	289.	292.	289.	295.	287.	265.	249.	242.	247.	242.
IN	251.	256.	261.	262.	260.	319.	385.	572.	657.	688.
IN	616.	547.	499.	477.	442.	428.	427.	398.	395.	396.
IN	391.	395.	386.	399.	399.	400.	385.	409.	440.	433.
IN	433.	466.	466.	464.	442.	409.	384.	394.	417.	415.
IN	383.	379.	378.	376.	369.	364.	367.	380.	386.	363.
IN	322.	318.	316.	311.	311.	310.				
BF	2	365								
IN	1	1925								
IN	288.	275.	271.	275.	279.	286.	289.	295.	300.	290.
IN	255.	246.	250.	258.	266.	291.	318.	317.	301.	294.
IN	288.	288.	345.	627.	1073.	1261.	989.	691.	611.	554.
IN	468.	373.	286.	353.	508.	682.	744.	821.	877.	942.
IN	939.	866.	805.	793.	781.	762.	719.	697.	655.	624.
IN	623.	626.	631.	637.	593.	580.	520.	492.	489.	492.
IN	505.	491.	482.	454.	430.	440.	445.	458.	460.	460.
IN	485.	492.	495.	510.	505.	489.	518.	478.	475.	460.
IN	435.	426.	423.	414.	414.	383.	393.	400.	380.	388.
IN	420.	472.	567.	665.	693.	706.	768.	1341.	2322.	2380.
IN	1867.	1434.	1099.	945.	885.	830.	852.	827.	759.	661.
IN	586.	560.	588.	858.	1423.	1355.	1122.	1154.	1173.	1042.
IN	913.	796.	742.	712.	709.	709.	650.	620.	1908.	3884.
IN	2847.	1632.	1084.	889.	775.	697.	645.	668.	748.	748.
IN	696.	646.	636.	580.	637.	681.	614.	574.	511.	498.
IN	485.	463.	454.	423.	415.	528.	583.	466.	401.	363.
IN	361.	360.	486.	1088.	2032.	1925.	1366.	858.	630.	511.
IN	451.	407.	343.	302.	311.	318.	285.	271.	264.	251.
IN	236.	217.	207.	196.	185.	187.	190.	187.	170.	161.
IN	170.	184.	204.	219.	222.	225.	233.	222.	200.	195.
IN	208.	254.	288.	263.	227.	219.	216.	230.	294.	289.
IN	353.	562.	828.	808.	939.	1214.	1204.	1185.	1085.	1035.
IN	917.	822.	815.	743.	662.	731.	1154.	1286.	1198.	1150.
IN	1103.	1024.	1008.	860.	720.	551.	448.	388.	350.	303.
IN	273.	247.	224.	214.	211.	199.	177.	186.	205.	222.
IN	201.	161.	167.	210.	236.	271.	298.	286.	269.	280.
	314.	289.	270.	420.	1298.	2621.	1893.	1165.	909.	774.
IN	700.	607.	535.	530.	613.	602.	452.	366.	322.	309.
IN	291.	256.	247.	239.	224.	240.	275.	275.	292.	317.
IN	319.	320.	331.	348.	356.	397.	482.	574.	450.	420.
IN	403.	365.	330.	308.	300.	313.	325.	327.	330.	455.
IN	1036.	1728.	1679.	1054.	850.	761.	728.	714.	673.	619.
IN	566.	577.	572.	538.	505.	498.	501.	480.	466.	463.
IN	460.	447.	441.	430.	408.	418.	428.	465.	505.	473.
IN	476.	478.	475.	480.	455.	433.	414.	404.	393.	394.
IN	402.	382.	380.	390.	408.	352.	291.	289.	288.	285.
IN	281.	285.	306.	335.	380.					
BF	2	365								
IN	1	1926								
IN	433.	488.	522.	607.	713.	695.	709.	700.	596.	507.
IN	426.	370.	355.	393.	430.	494.	595.	691.	718.	708.
IN	608.	366.	331.	358.	410.	504.	549.	542.	529.	514.
IN	583.	626.	707.	663.	639.	667.	706.	679.	645.	643.
IN	601.	592.	577.	527.	493.	486.	505.	514.	572.	568.
IN	571.	596.	630.	655.	704.	752.	667.	495.	552.	639.
IN	654.	646.	614.	602.	569.	538.	546.	568.	538.	525.
IN	530.	534.	530.	526.	508.	505.	524.	530.	538.	555.
IN	581.	612.	624.	656.	666.	637.	631.	641.	670.	641.

IN	597.	601.	678.	839.	1072.	1404.	1643.	1546.	1423.	1524.
IN	2060.	2421.	2221.	1917.	1775.	1599.	1454.	1337.	1228.	1111.
IN	1021.	972.	934.	883.	825.	802.	763.	729.	714.	689.
IN	669.	630.	679.	808.	880.	799.	752.	741.	707.	763.
IN	861.	891.	795.	741.	708.	675.	671.	671.	657.	637.
IN	606.	568.	523.	497.	490.	445.	405.	368.	352.	350.
IN	365.	390.	422.	545.	707.	738.	598.	455.	365.	373.
IN	560.	751.	624.	418.	356.	323.	275.	263.	276.	256.
IN	244.	229.	261.	269.	279.	297.	333.	400.	418.	498.
IN	335.	264.	205.	174.	170.	176.	186.	191.	216.	335.
IN	358.	356.	393.	479.	561.	627.	576.	450.	355.	288.
IN	250.	232.	266.	340.	352.	295.	236.	204.	180.	161.
IN	153.	150.	150.	150.	167.	156.	142.	139.	136.	134.
IN	123.	115.	108.	110.	113.	158.	313.	814.	2172.	2478.
IN	2054.	2345.	1510.	1198.	857.	803.	916.	759.	482.	380.
IN	315.	467.	797.	558.	375.	12544.	16134.	30144.	14990.	3656.
IN	1802.	227.	92.	866.	1222.	1030.	1675.	1878.	1605.	1459.
IN	1163.	888.	769.	687.	577.	518.	491.	450.	444.	479.
IN	523.	531.	517.	17309.	31297.	63846.	68991.	57776.	33926.	18434.
IN	8363.	4479.	3134.	2869.	4233.	5923.	7339.	5790.	3841.	2800.
IN	2134.	1810.	1588.	1436.	1364.	1279.	1165.	1103.	1000.	953.
IN	941.	934.	938.	911.	854.	810.	771.	758.	752.	741.
IN	1048.	1871.	2660.	2858.	2653.	2296.	1775.	1635.	1667.	1591.
IN	1385.	1199.	1160.	1106.	1032.	976.	964.	952.	944.	932.
IN	907.	896.	876.	857.	821.	795.	795.	781.	773.	786.
IN	877.	1057.	1160.	1186.	1122.	1040.	965.	865.	727.	705.
IN	728.	763.	786.	808.	866.	935.	946.	932.	889.	865.
IN	832.	807.	799.	798.	796.					

EJ

# OUTPUT FROM TEST DATA

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*          STATS           *  

* STATISTICAL ANALYSIS OF TIME SERIES DATA *  

* PROGRAM DATE      - - - - - JULY 1982 *  

* VERSION DATE      - - - - - 12 MAY 1986 *  

* RUN   DATE AND TIME: *  

*       7 JAN 87        8:38:26    *  

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* U.S. ARMY CORPS OF ENGINEERS *  

* THE HYDROLOGIC ENGINEERING CENTER *  

* 609 SECOND STREET *  

* DAVIS, CALIFORNIA 95616 *  

* (916) 551-1748 OR (FTS) 460-1748 *
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\*\*TITLE CARD(S)\*\*  
 TT TEST NO. 1 -- STATISTICAL ANALYSIS OF TIME SERIES DATA  
 TT ANALYTICAL ANALYSIS OF MONTHLY FLOWS  
 TT ANALYZE BOTH MAXIMUM AND MINIMUM VALUES (ANNUAL SERIES)

\*\*JOB SPECIFICATIONS\*\*

JSTAT	NPRDS	NYRS	MONWY	JBEGN	JEND	JPPF	MONSS	LOGTM	NDECM
J1	10	12	0	0	0	0	0	0	0

\*\*LOCATION IDENTIFICATION\*\*

ID WINNIBIGOSHISH RESERVOIR INFLOW

\*\*LOCATION SPECIFICATIONS\*\*

IANAL	NAME	LOGT	NDEC	NSIG	IPRNT	TEST
LS	3FLOW,CFS	0	0	0	0	0.

\*\*INPUT TIME SERIES DATA\*\*

IN	1930	212.	483.	356.	498.	924.	484.	186.	464.	509.	337.	278.	234.
IN	1931	166.	224.	308.	247.	305.	122.	149.	107.	26.	137.	168.	236.
IN	1932	263.	289.	273.	425.	906.	289.	155.	101.	209.	138.	361.	295.
IN	1933	304.	299.	309.	465.	857.	207.	289.	302.	156.	46.	188.	152.
IN	1934	161.	146.	187.	224.	189.	184.	178.	244.	95.	32.	104.	144.
IN	1935	176.	109.	92.	552.	436.	525.	670.	15.	24.	181.	207.	240.
IN	1936	189.	181.	370.	509.	899.	259.	282.	253.	65.	206.	76.	120.
IN	1937	198.	296.	318.	682.	907.	476.	205.	141.	1365.	553.	413.	220.
IN	1938	258.	235.	227.	815.	2438.	1496.	177.	467.	48.	44.	272.	175.
IN	1939	261.	162.	218.	605.	348.	614.	229.	65.	239.	118.	72.	131.

## - ANALYSIS OF MAXIMUMS -

-PLOT MAXIMUMS- WINNIBIGOSHISH RESERVOIR INFLOW

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*.....EVENTS ANALYZED.....*.....ORDERED EVENTS.....*  

*          CALENDAR          MEDIAN          *  

* MON DAY YEAR FLOW,CFS * RANK YEAR FLOW,CFS PLOT POS *  

*-----*-----*-----*-----*-----*-----*-----*-----*  

* 5 -1 1930 924. * 1 1938 2438. 6.73 *  

* 3 -1 1931 308. * 2 1937 1365. 16.35 *  

* 5 -1 1932 906. * 3 1930 924. 25.96 *  

* 5 -1 1933 857. * 4 1932 906. 35.58 *  

* 8 -1 1934 244. * 5 1936 899. 45.19 *  

* 7 -1 1935 670. * 6 1933 857. 54.81 *  

* 5 -1 1936 899. * 7 1935 670. 64.42 *  

* 9 -1 1937 1365. * 8 1939 614. 74.04 *  

* 5 -1 1938 2438. * 9 1951 308. 83.65 *  

* 6 -1 1939 614. * 10 1934 244. 93.27 *
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\*\*\*\*\* ANALYTICAL FIT TO DATA \*\*\*\*\*

\*\*\*\*\*  
 CAUTION FROM SUBROUTINE MTSKew

\*\*\*\*\* NO GENERALIZED SKew PROVIDED  
 ADOPTED SKew SET TO COMPUTED SKew

-FREQUENCY CURVE- WINNIBIGOSHISH RESERVOIR INFLOW

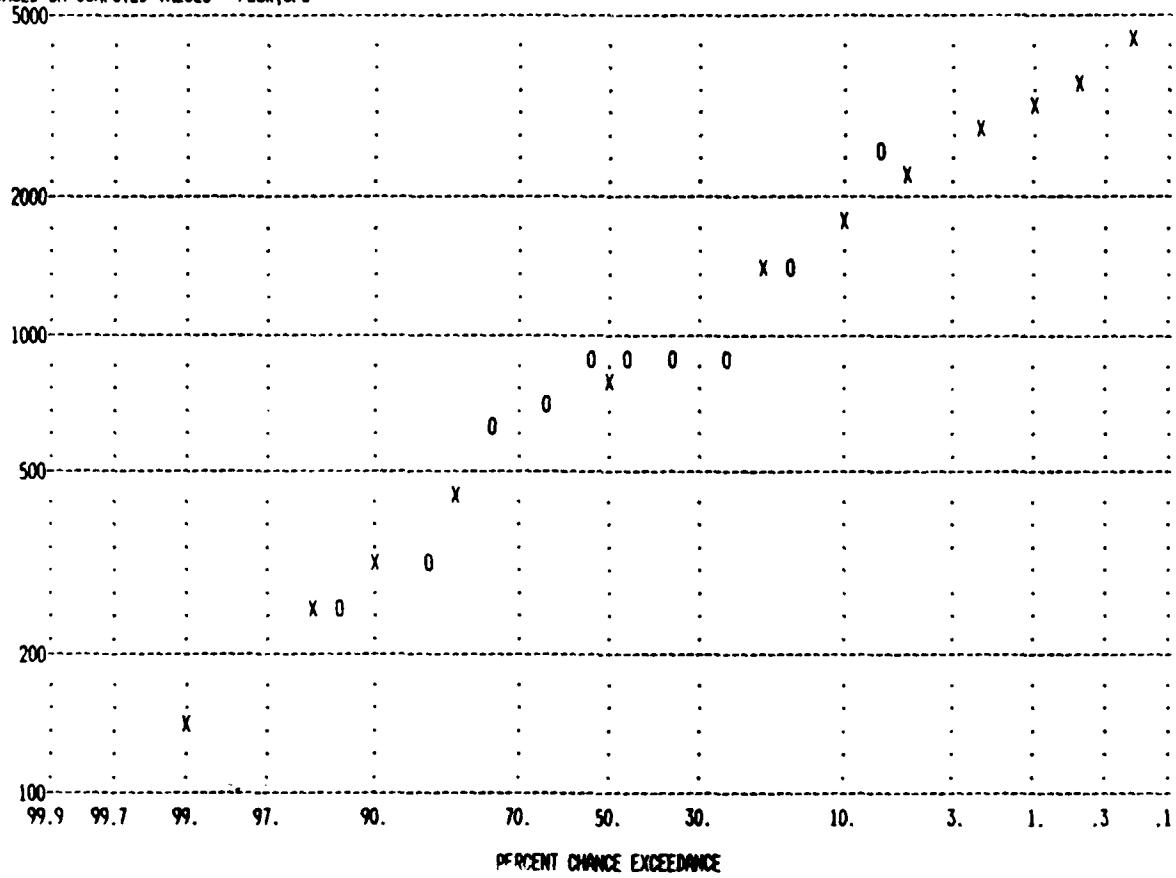
FLOW,CFS	PERCENT CHANCE	CONFIDENCE LIMITS
EXPECTED		
COMPUTED PROBABILITY	EXCEEDANCE	0.05 LIMIT 0.95 LIMIT
4400.	8000.	0.2
3730.	5830.	0.5
3250.	4600.	1.0
2780.	3610.	2.0
2190.	2580.	5.0
1760.	1950.	10.0
1340.	1410.	20.0
779.	779.	50.0
439.	413.	80.0
321.	284.	90.0
246.	200.	95.0
147.	90.	99.0

SYSTEMATIC STATISTICS

LOG TRANSFORM OF FLOW,CFS	NUMBER OF EVENTS
MEAN	2.8822
STANDARD DEV	0.2888
COMPUTED SKEW	-0.2120
GENERALIZED SKEW	-99.0000
ADOPTED SKEW	-0.2000

HISTORIC EVENTS      HIGH OUTLIERS      LOW OUTLIERS      ZERO OR MISSING      SYSTEMATIC EVENTS

-FREQUENCY PLOT - WINNIBIGOSHISH RESERVOIR INFLOW  
BASED ON COMPUTED VALUES - FLOW,CFS



LEGEND - 0:OBSERVED VALUE, X:HIGH OUTLIER OR HISTORIC VALUE, L:LOW OUTLIER, Z:ZERO OR MISSING, X:COMPUTED CURVE

- ANALYSIS OF MINIMUMS -

-PLOTTING POSITIONS WINNIBIGOSHISH RESERVOIR INFLOW

EVENTS ANALYZED				ORDERED EVENTS		
MON	DAY	YEAR	FLOW,CFS	CALENDAR	YEAR	MEDIAN
				RANK	FLOW,CFS	PLOT POS
7	-1	1930	186.	1	1935	15.
9	-1	1931	26.	2	1931	16.35
8	-1	1932	101.	3	1934	25.96
10	-1	1933	46.	4	1938	35.58
10	-1	1934	32.	5	1933	45.19
6	-1	1935	15.	6	1936	54.81
9	-1	1936	65.	7	1939	64.42
8	-1	1937	141.	8	1932	74.04
10	-1	1938	44.	9	1937	83.65
8	-1	1939	65.	10	1930	93.27

\*\*\*\*\* ANALYTICAL FIT TO DATA \*\*\*\*\*

\*\*\*\*\* CAUTION FROM SUBROUTINE WTSKEW  
\*\*\*\*\* NO GENERALIZED SKEW PROVIDED  
ADOPTED SKEW SET TO COMPUTED SKEW

-FREQUENCY CURVE- WINNIBIGOSHISH RESERVOIR INFLOW

FLOW,CFS	PERCENT	CONFIDENCE LIMITS
EXPECTED	CHANCE NON-	
COMPUTED PROBABILITY	EXCEEDANCE	0.05 LIMIT 0.95 LIMIT
6.	2.	0.2
8.	4.	0.5
9.	6.	1.0
11.	8.	2.0
16.	13.	5.0
21.	18.	10.0
29.	27.	20.0
56.	56.	50.0
107.	114.	80.0
150.	171.	90.0
199.	247.	95.0
338.	553.	99.0
		1180.

SYSTEMATIC STATISTICS

LOG TRANSFORM OF FLOW,CFS	NUMBER OF EVENTS		
MEAN	1.7451	HISTORIC EVENTS	0
STANDARD DEV	0.3370	HIGH OUTLIERS	0
COMPUTED SKEW	-0.0271	LOW OUTLIERS	0
GENERALIZED SKEW	-99.0000	ZERO OR MISSING	0
ADOPTED SKEW	0.0000	SYSTEMATIC EVENTS	10

-FREQUENCY PLOT - WINNIBIGOSHISH RESERVOIR INFLOW  
BASED ON COMPUTED VALUES - FLOW,CFS

500

200

0

0

X

0

100

50

0

0

X

0

0

X

0

20

0

X

X

10

X

X

X

5

99.9 99.7 99. 97. 90. 70. 50. 30. 10. 3. 1. .3 .1

PERCENT CHANCE NON-EXCEEDANCE

LEGEND - O:OBSERVED VALUE, H:HIGH OUTLIER OR HISTORIC VALUE, L:LOW OUTLIER, Z:ZERO OR MISSING, X:COMPUTED CURVE

TEST NO. 1 -- STATISTICAL ANALYSIS OF TIME SERIES DATA  
 ANALYTICAL ANALYSIS OF MONTHLY FLOWS  
 ANALYZE BOTH MAXIMUM AND MINIMUM VALUES (ANNUAL SERIES)

-MONTHLY SUMMARY- WINNIBIGOSHISH RESERVOIR INFLOW

YEAR	MONTHLY AND ANNUAL MEAN VALUES, FLOW,CFS												
	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	ANNUAL
1930	212.	483.	356.	498.	924.	484.	186.	464.	509.	337.	278.	234.	414.
1931	166.	224.	308.	247.	305.	122.	149.	107.	26.	137.	168.	236.	183.
1932	263.	289.	273.	425.	906.	209.	155.	101.	209.	138.	361.	295.	309.
1933	304.	299.	309.	465.	857.	207.	289.	302.	156.	46.	188.	152.	298.
1934	161.	146.	187.	224.	189.	184.	178.	244.	95.	32.	104.	144.	157.
1935	176.	109.	92.	552.	436.	525.	670.	15.	24.	181.	207.	240.	269.
1936	189.	181.	370.	509.	899.	259.	282.	253.	65.	206.	76.	120.	284.
1937	198.	296.	318.	682.	907.	476.	205.	141.	1365.	553.	413.	220.	481.
1938	258.	235.	227.	815.	2438.	1496.	177.	467.	48.	44.	272.	175.	554.
1939	261.	162.	218.	605.	348.	614.	229.	65.	239.	118.	72.	131.	255.
MEAN	219.	242.	266.	502.	821.	466.	252.	216.	274.	179.	214.	195.	320.
MAX	304.	483.	370.	815.	2438.	1496.	670.	467.	1365.	553.	413.	295.	554.
MIN	161.	109.	92.	224.	189.	122.	149.	15.	24.	32.	72.	120.	157.
STDEV	49.	107.	85.	180.	640.	398.	155.	159.	410.	160.	117.	58.	126.
SKW	0.	1.	-1.	0.	2.	2.	3.	1.	3.	2.	0.	0.	1.

```
=====
*          STATS          *
* STATISTICAL ANALYSIS OF TIME SERIES DATA *
* PROGRAM DATE      - - - - - JULY 1982 *
* VERSION DATE      - - - - - 12 MAY 1986 *
* RUN   DATE   AND   TIME:   *
*   7 JAN 87       8:38:38   *
*                               *
=====
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\*\*TITLE CARD(S)\*\*  
 TT TEST NO. 2 -- STATISTICAL ANALYSIS OF TIME SERIES DATA  
 TT GRAPHICAL ANALYSIS OF MONTHLY RESERVOIR ELEVATIONS  
 TT ONLY MONTHS OF MAY THRU SEPT USED IN ANALYSIS  
 TT PRINTOUT SIX (6) SIGNIFICANT FIGURES WITH TWO DECIMAL PLACES  
 TT RV CARD USED TO ADD 1290 FEET TO INPUT VALUES  
 TT LOG TRANSFORM AND FREQUENCY CURVE PLOT SUPPRESSED

\*\*JOB SPECIFICATIONS\*\*  
 JSTAT NPRODS NYRS MNWY JBEGN JEND JPFF MNSS LOGTM NDEC  
 J1 9 12 0 1 5 9 0 0 0 -1

\*\*LOCATION IDENTIFICATION\*\*  
 ID WINNIBIGOSHISH RESERVOIR ELEVATION, 1290 FEET ADDED TO INPUT

\*\*LOCATION SPECIFICATIONS\*\*  
 IANAL NAME LOGT NDEC NSIG IPRT TEST  
 LS 3STAGE,FT -1 2 6 16 0.

SELECTED OUTPUT OPTIONS  
 16 = SUPPRESS FREQUENCY PLOT

\*\*REVISION OF DATA\*\*  
 IFUNC CONST  
 RV 1 1290.0000

\*\*INPUT TIME SERIES DATA\*\*

1930	7.	7.	7.	7.	8.	8.	8.	7.	6.	6.	7.	7.
1931	7.	7.	7.	7.	7.	7.	7.	7.	7.	7.	7.	7.
1932	7.	7.	7.	7.	8.	8.	8.	8.	7.	7.	7.	6.
1933	5.	5.	5.	5.	6.	6.	6.	6.	5.	5.	5.	5.
1934	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.	5.
1935	5.	5.	5.	5.	6.	6.	6.	7.	7.	7.	7.	7.

- ANALYSIS OF MAXIMUMS -

-PLOTTING POSITIONS- WINNIBIGOSHISH RESERVOIR ELEVATION, 1290 FEET ADD

.....EVENTS ANALYZED.....				.....ORDERED EVENTS.....			
MON	DAY	YEAR	STAGE,FT	RANK	CALENDAR	YEAR	MEDIAN
7	-1	1930	1298.30	1	1930	1298.30	10.94
6	-1	1931	1297.29	2	1932	1298.10	26.56
6	-1	1932	1298.10	3	1931	1297.29	42.19
6	-1	1933	1296.39	4	1935	1296.71	57.81
6	-1	1934	1295.31	5	1933	1296.39	73.44
8	-1	1935	1296.71	6	1934	1295.31	89.06

\*\*\*\* GRAPHICAL FIT TO DATA \*\*\*\*

-FREQUENCY CURVE- WINNIBIGOSHISH RESERVOIR ELEVATION, 1290 FEET ADD

.....STAGE,FT.....				PERCENT		...CONFIDENCE LIMITS...	
EXPECTED	CHANCE	EXCEEDANCE	0.50 LIMIT	0.50	0.50	LIMIT	0.50
1298.69	1298.69	0.2	-1.00	-1.00	-1.00	-1.00	-1.00
1298.62	1298.62	0.5	-1.00	-1.00	-1.00	-1.00	-1.00
1298.56	1298.56	1.0	-1.00	-1.00	-1.00	-1.00	-1.00
1298.49	1298.49	2.0	-1.00	-1.00	-1.00	-1.00	-1.00
1298.40	1298.40	5.0	-1.00	-1.00	-1.00	-1.00	-1.00
1298.31	1298.31	10.0	-1.00	-1.00	-1.00	-1.00	-1.00
1298.20	1298.20	20.0	-1.00	-1.00	-1.00	-1.00	-1.00
1296.97	1296.97	50.0	-1.00	-1.00	-1.00	-1.00	-1.00
1296.09	1296.09	80.0	-1.00	-1.00	-1.00	-1.00	-1.00
1295.20	1295.20	90.0	-1.00	-1.00	-1.00	-1.00	-1.00
1294.40	1294.40	95.0	-1.00	-1.00	-1.00	-1.00	-1.00
1292.91	1292.91	99.0	-1.00	-1.00	-1.00	-1.00	-1.00

- ANALYSIS OF MINIMUMS -

-PLOTTING POSITIONS- WINNIBIGOSHISH RESERVOIR ELEVATION, 1290 FEET ADD

.....EVENTS ANALYZED.....				.....ORDERED EVENTS.....			
MON	DAY	YEAR	STAGE,FT	RANK	CALENDAR	YEAR	MEDIAN
9	-1	1930	1296.12	1	1934	1294.65	10.94
9	-1	1931	1296.80	2	1933	1295.29	26.56
9	-1	1932	1297.09	3	1935	1295.60	42.19
9	-1	1933	1295.29	4	1930	1296.12	57.81
9	-1	1934	1294.65	5	1931	1296.80	73.44
5	-1	1935	1295.60	6	1932	1297.09	89.06

\*\*\*\*\* GRAPHICAL FIT TO DATA \*\*\*\*\*

-FREQUENCY CURVE- WINNIBIGOSHISH RESERVOIR ELEVATION, 1290 FEET ADD

STAGE, FT.....	PERCENT.....	CONFIDENCE LIMITS.....
EXPECTED	CHANGE NON	
COMPUTED PROBABILITY	EXCEEDANCE	0.50 LIMIT 0.50 LIMIT
1292.66	1292.66	0.2 * -1.00 -1.00 *
1293.03	1293.03	0.5 * -1.00 -1.00 *
1293.33	1293.33	1.0 * -1.00 -1.00 *
1293.66	1293.66	2.0 * -1.00 -1.00 *
1294.15	1294.15	5.0 * -1.00 -1.00 *
1294.59	1294.59	10.0 * -1.00 -1.00 *
1295.09	1295.09	20.0 * -1.00 -1.00 *
1295.84	1295.84	50.0 * -1.00 -1.00 *
1296.93	1296.93	80.0 * -1.00 -1.00 *
1297.11	1297.11	90.0 * -1.00 -1.00 *
1297.24	1297.24	95.0 * -1.00 -1.00 *
1297.48	1297.48	99.0 * -1.00 -1.00 *

TEST NO. 2 -- STATISTICAL ANALYSIS OF TIME SERIES DATA  
GRAPHICAL ANALYSIS OF MONTHLY RESERVOIR ELEVATIONS  
ONLY MONTHS OF MAY THRU SEPT USED IN ANALYSIS

-MONTHLY SUMMARY- WINNIBIGOSHISH RESERVOIR ELEVATION, 1290 FEET ADDED TO INPUT

YEAR	MONTHLY AND ANNUAL MEAN VALUES, STAGE, FT												
	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	ANNUAL
1930	1297.19	1297.07	1296.94	1297.13	1297.71	1298.27	1298.30	1297.06	1296.12	1296.43	1296.62	1296.77	1297.13
1931	1296.87	1296.92	1296.94	1297.01	1297.18	1297.29	1297.18	1296.96	1296.80	1296.76	1296.80	1296.90	1296.97
1932	1297.05	1297.03	1296.94	1297.09	1297.63	1298.10	1298.07	1297.73	1297.09	1296.57	1296.57	1295.87	1297.14
1933	1295.05	1295.05	1295.05	1295.36	1295.97	1296.39	1296.25	1295.85	1295.29	1294.94	1294.94	1294.94	1295.42
1934	1294.94	1294.94	1294.99	1295.10	1295.22	1295.31	1295.20	1294.89	1294.65	1294.56	1294.58	1294.66	1294.92
1935	1294.78	1294.88	1294.92	1295.18	1295.60	1296.01	1296.48	1296.71	1296.61	1296.59	1296.68	1296.80	1295.94
MEAN	1295.98	1295.98	1295.96	1296.14	1296.55	1296.89	1296.91	1296.53	1296.09	1295.97	1296.03	1295.99	1296.25
MAY	1297.19	1297.07	1296.94	1297.13	1297.71	1298.27	1298.30	1297.73	1297.09	1296.76	1296.80	1296.90	1297.14
MIN	1294.78	1294.88	1294.92	1295.10	1295.22	1295.31	1295.20	1294.89	1294.65	1294.56	1294.58	1294.66	1294.92
STDEV	1.17	1.13	1.07	1.62	1.09	1.19	1.17	1.01	0.95	0.96	0.99	1.00	0.96
SKW	0.01	0.00	-0.01	-0.02	-0.08	-0.07	-0.22	-0.82	-0.72	-0.98	-1.00	-0.53	-0.41

```
*****STATS*****
* STATISTICAL ANALYSIS OF TIME SERIES DATA *
* PROGRAM DATE - - - - - JULY 1982 *
* VERSION DATE - - - - - 12 MAY 1986 *
* RUN DATE AND TIME: *
* 7 JAN 87 8:38:45 *
*****U.S. ARMY CORPS OF ENGINEERS *
* THE HYDROLOGIC ENGINEERING CENTER *
* 609 SECOND STREET *
* DAVIS, CALIFORNIA 95616 *
* (916) 551-1748 OR (FTS) 460-1748 *
*****
```

\*\*TITLE CARD(S)\*\*  
 TT TEST NO. 3 -- STATISTICAL ANALYSIS OF TIME SERIES DATA  
 TT ANALYTICAL ANALYSIS OF DAILY FLOWS  
 TT COMPUTE DURATION CURVE ALONG WITH MAXIMUM AND MINIMUM ANALYSIS  
 TT COMPUTE STATISTICS OF LOGS FOR MONTHLY SUMMARY TABLES  
 TT INPUT LISTING OF DAILY DATA SUPPRESSED  
 TT TEST OF 5 YEARS 1922-26

\*\*JOB SPECIFICATIONS\*\*  
 JSTAT NPROS NYRS MNMMY JBGN JEND JPPF MONSS LOGTH NODECM  
 J1 24 365 0 1 0 0 0 0 0 -1 0

\*\*LOCATION IDENTIFICATION\*\*  
 ID KAW LAKE INFLOWS

\*\*LOCATION SPECIFICATIONS\*\*  
 IANAL NAME LOGT NODEC NSIG IPRT TEST  
 LS 3FLOW,CFS 0 0 0 1 0.

SELECTED OUTPUT OPTIONS  
 1 : SUPPRESS INPUT TIME SERIES DATA

\*\*INPUT CLASS LIMITS\*\*  
 CL 29 100. 200. 300. 400. 500. 600. 700. 800. 900.  
 CL 1000. 2000. 3000. 4000. 5000. 6000. 7000. 8000. 9000. 10000.  
 CL20000. 30000. 40000. 50000. 60000. 70000. 80000. 90000. 100000. 200000.

- ANALYSIS OF MAXIMUMS -

PLOTTING POSITIONS- KAW LAKE INFLOWS

```
*****EVENTS ANALYZED..... ORDERED EVENTS..... *****
* .....CALENDAR MEDIAN ..... *
* MON DAY YEAR FLOW,CFS * RANK YEAR FLOW,CFS PLOT POS *
* ..... *
* 7 12 1922 4.43 * 1 1922 110960. 12.96 *
* 6 10 1923 110960. * 2 1926 68991. 31.48 *
* 5 1 1924 24276. * 3 1922 47437. 50.00 *
* 5 10 1925 3884. * 4 1924 24276. 68.52 *
* 10 4 1926 68991. * 5 1925 3884. 87.04 *
*****
```

\*\*\*\*\* ANALYTICAL FIT TO DATA \*\*\*\*\*

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*****CAUTION FROM SUBROUTINE WTSKew
*****NO GENERALIZED SKEW PROVIDED
ADOPTED SKEW SET TO COMPUTED SKEW
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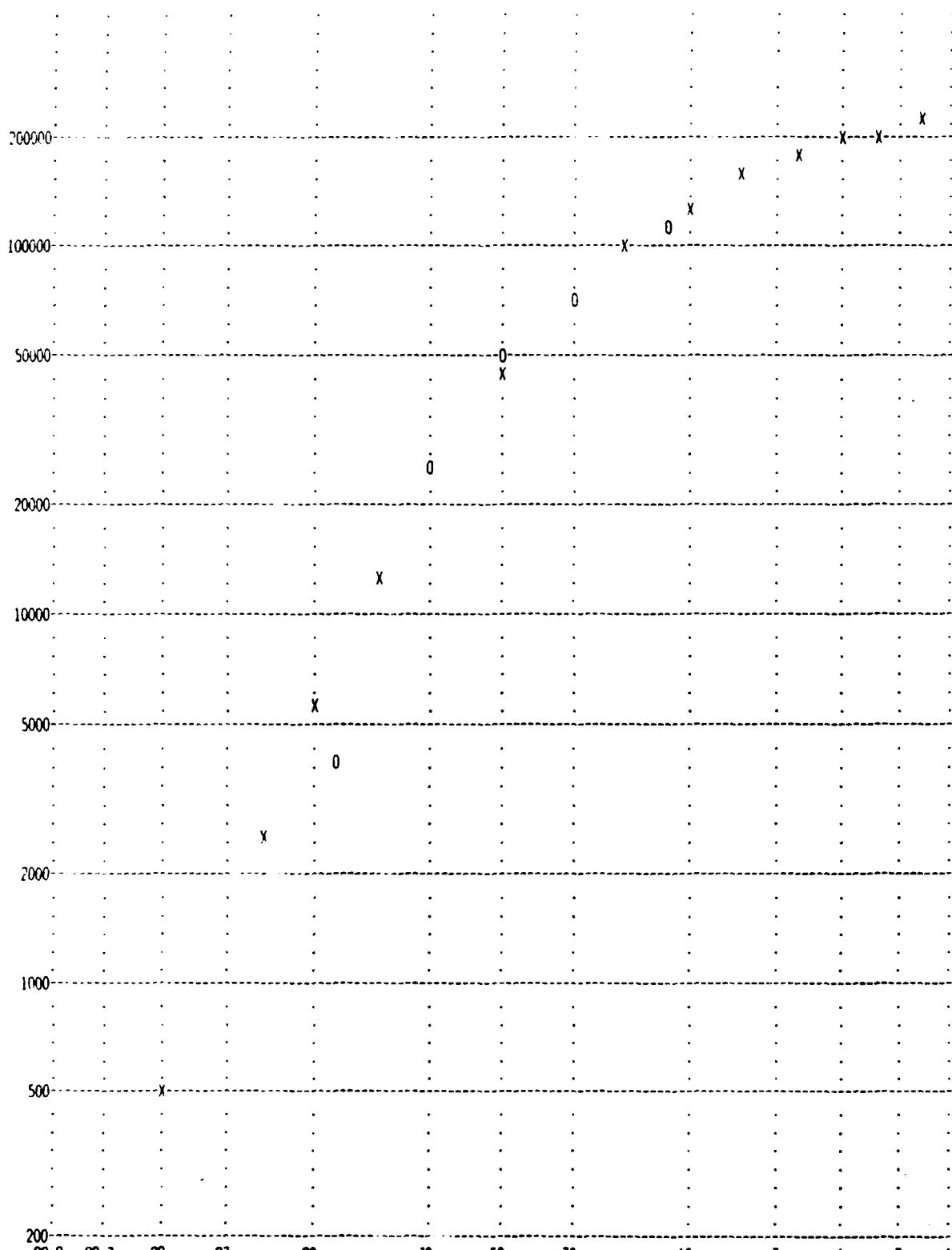
-FREQUENCY CURVE- KAW LAKE INFLOWS

FLOW,CFS.....	PERCENT	CONFIDENCE LIMITS...
EXPECTED	CHANCE	
COMPUTED PROBABILITY	EXCEEDANCE	0.05 LIMIT 0.95 LIMIT
217000.	278000.	0.2 447000. 73900.
206000.	253000.	0.5 4000000. 71100.
195000.	239000.	1.0 3550000. 68000.
181000.	227000.	2.0 3000000. 63900.
155000.	196000.	5.0 2130000. 56200.
129000.	157000.	10.0 1430000. 48000.
96000.	109000.	20.0 770000. 36600.
42300.	42300.	50.0 162000. 14600.
12600.	8870.	80.0 32800. 1840.
5600.	2410.	90.0 15900. 330.
2610.	474.	95.0 8820. 59.
486.	i.	99.0 2730. 1.

SYSTEMATIC STATISTICS

LOG TRANSFORM OF FLOW,CFS	NUMBER OF EVENTS
MEAN	4.5069 * HISTORIC EVENTS 0
STANDARD DEV	0.5669 * HIGH OUTLIERS 0
COMPUTED SKEW	-1.3201 * LOW OUTLIERS 0
GENERALIZED SKEW	-99.0000 * ZERO OR MISSING 0
ADOPTED SKEW	-1.3000 * SYSTEMATIC EVENTS 5

-FREQUENCY PLOT - KAW LAKE INFLOWS  
BASED ON COMPUTED VALUES - FLOW,CFS  
500000



LEGEND - O:OBSERVED VALUE, H:HIGH OUTLIER OR HISTORIC VALUE, L:LOW OUTLIER, Z:ZERO OR MISSING, X:COMPUTED CURVE

- ANALYSIS OF MINIMUMS -

-PLOTTING POSITIONS- KAW LAKE INFLOWS

EVENTS ANALYZED			ORDERED EVENTS					
MON	DAY	YEAR	FLOW,CFS	RANK	YEAR	CALENDAR	MEDIAN	PLOT POS
1	7	1922	83.	1	1923	26.	12.96	1
4	3	1923	26.	2	1922	83.	31.48	2
9	10	1924	181.	3	1926	92.	50.00	3
7	9	1925	161.	4	1925	161.	68.52	2
9	10	1926	92.	5	1924	181.	87.04	3

\*\*\*\*\* ANALYTICAL FIT TO DATA \*\*\*\*\*

\*\*\*\*\* CAUTION FROM SUBROUTINE WTSKew

\*\*\*\*\* NO GENERALIZED SKEW PROVIDED  
ADOPTED SKEW SET TO COMPUTED SKEW

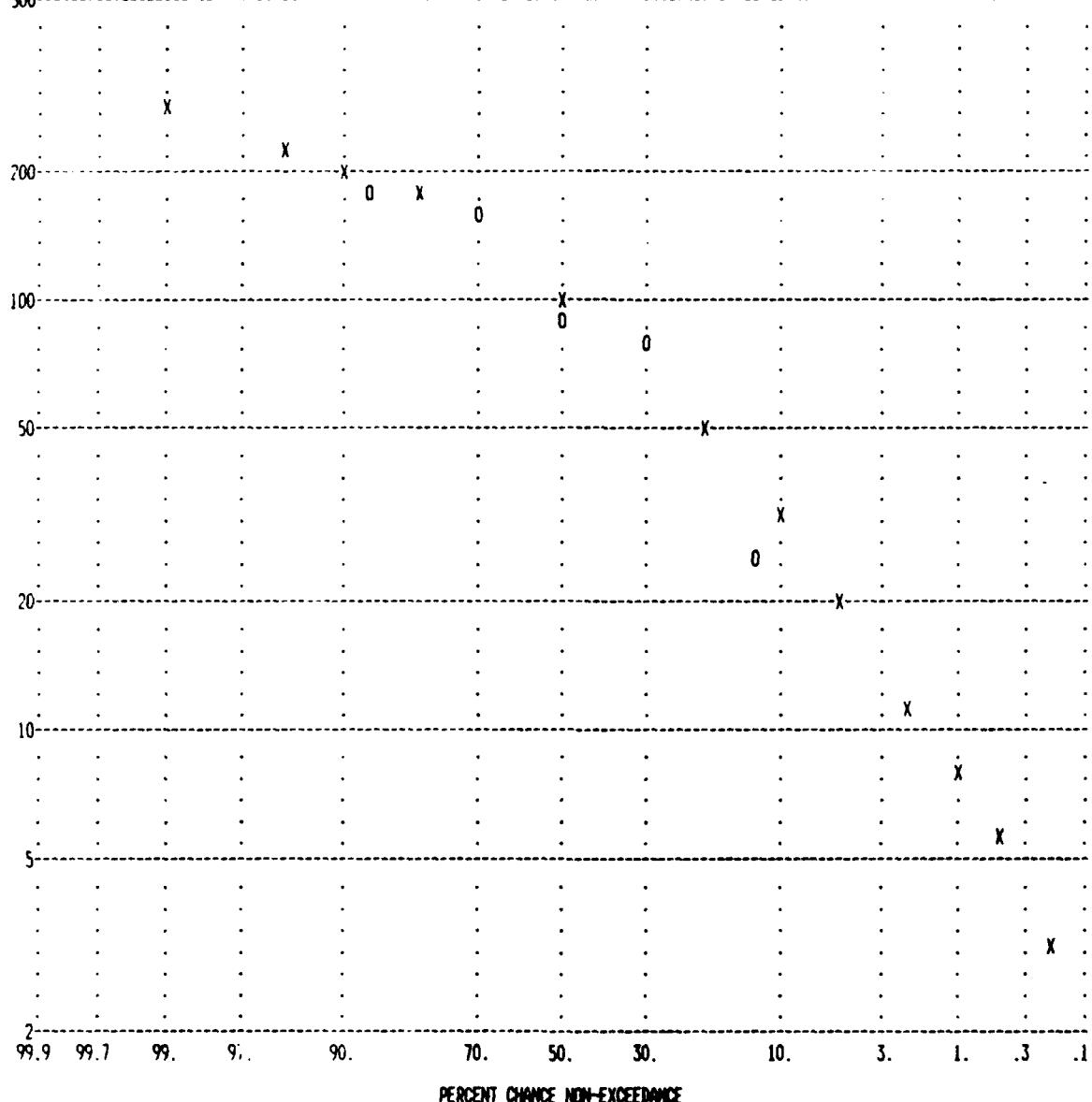
-FREQUENCY CURVE- KAW LAKE INFLOWS

FLOW,CFS	PERCENT	CONFIDENCE LIMITS
3.	0.	0.2
5.	0.	0.5
8.	0.	1.0
12.	2.	2.0
21.	8.	5.0
32.	20.	10.0
51.	42.	20.0
104.	104.	50.0
172.	186.	80.0
207.	236.	90.0
234.	274.	95.0
274.	321.	99.0

\*\*\*\*\* SYSTEMATIC STATISTICS

LOG TRANSFORM OF FLOW,CFS	NUMBER OF EVENTS
MEAN	1.9525
STANDARD DEV	0.3347
COMP. SKW	-1.2276
GENERALIZED SKW	-99.0000
ADOPTED SKW	-1.2000
HISTORIC EVENTS	0
HIGH OUTLIERS	0
LOW OUTLIERS	0
ZERO OR MISSING	0
SYSTEMATIC EVENTS	5

-FREQUENCY PLOT - KAW LAKE INFLOWS  
BASED ON COMPUTED VALUES - FLOW,CFS  
500-



PERCENT CHANCE NON-EXCEEDANCE

LEGEND - O:OBSERVED VALUE, H:HIGH OUTLIER OR HISTORIC VALUE, L:LOW OUTLIER, Z:ZERO OR MISSING, X:COMPUTED CURVE

- DURATION ANALYSIS -

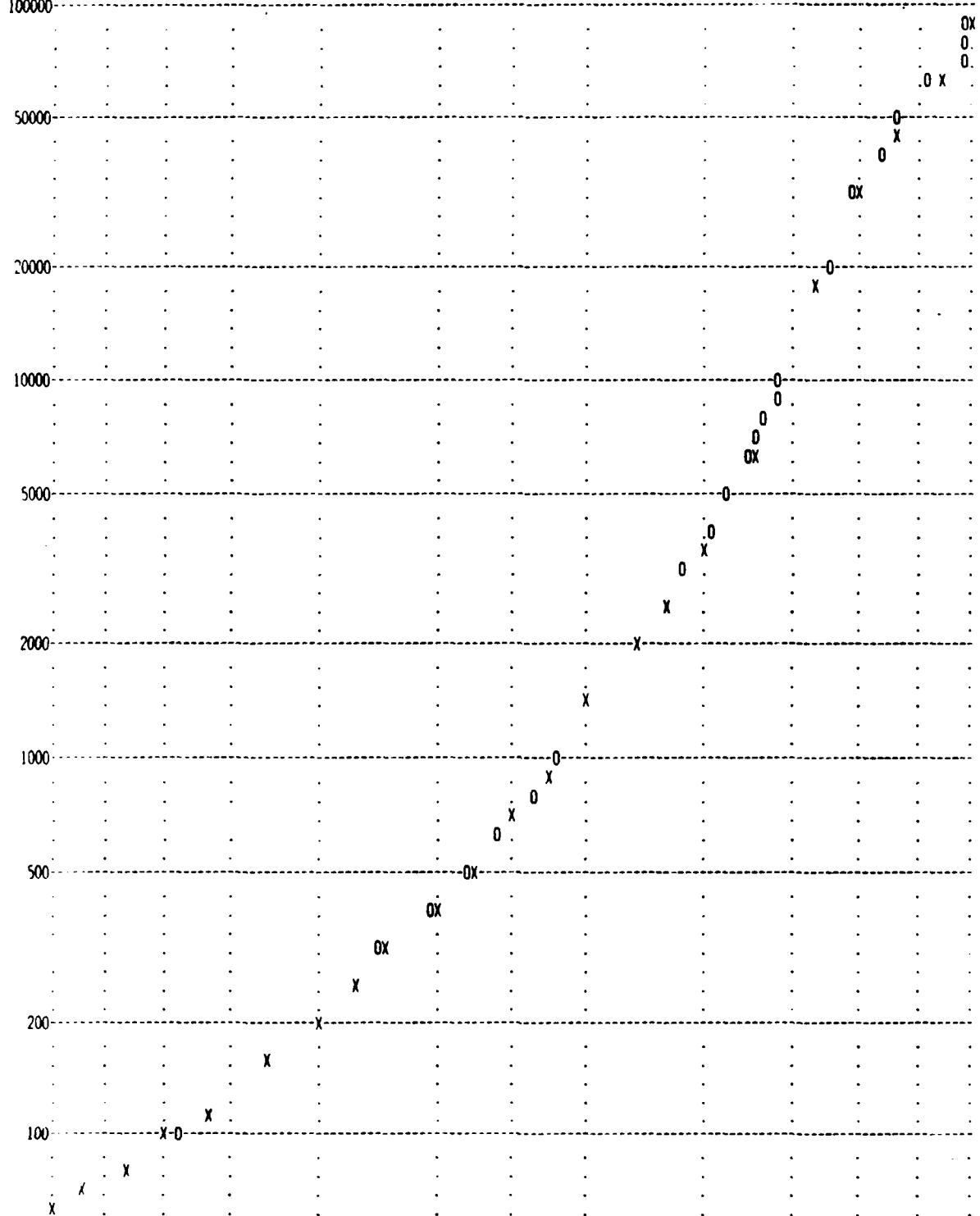
-DURATION DATA- KAW LAKE INFLOWS

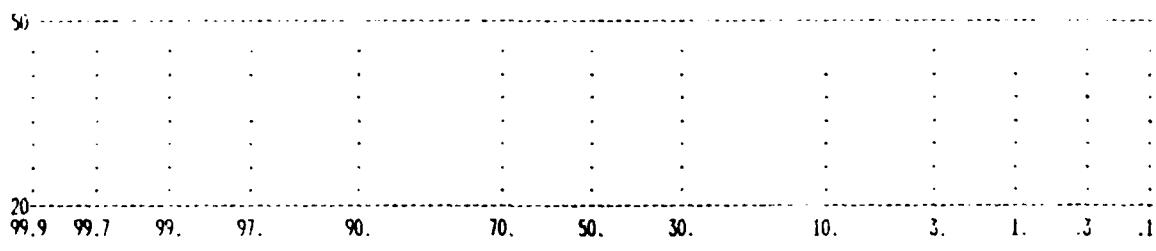
*	LOWER NUMBER	PERCENT	*	LOWER NUMBER	PERCENT	*	LOWER NUMBER	PERCENT	*
*	CLASS	CLASS	IN	ACCUM	EQUAL OR	*	CLASS	CLASS	IN
*	NUMBER	LIMIT	CLASS	NUMBER	EXCEED	*	NUMBER	LIMIT	CLASS
*		FLOW,CFS				*		FLOW,CFS	
*	0	26.00	22	1826	100.00	*			*
*	1	100.00	159	1804	98.80	*	11	2000.00	145
*	2	200.00	165	1645	90.09	*	12	3000.00	57
*	3	300.00	186	1480	81.05	*	13	4000.00	33
*	4	400.00	169	1294	70.87	*	14	5000.00	26
*	5	500.00	128	1125	61.61	*	15	6000.00	18
*	6	600.00	101	997	54.60	*	16	7000.00	8
*	7	700.00	92	896	49.07	*	17	8000.00	13
*	8	800.00	64	804	44.03	*	18	9000.00	3
*	9	900.00	45	740	40.53	*	19	10000.00	33
*	10	1000.00	329	695	38.06	*	20	20000.00	11
						*			*
						*			*
						*			*
						*			*

-INTERPOLATED DURATION CURVE- KAW LAKE INFLOWS

*	PERCENT	INTERPOLATED	*	PERCENT	INTERPOLATED	*
*	EQUAL OR	MAGNITUDE	*	EQUAL OR	MAGNITUDE	*
*	EXCEED	FLOW,CFS	*	EXCEED	FLOW,CFS	*
*			*			*
*	0.01	111000.	*	60.00	521.	*
*	0.05	111000.	*	70.00	409.	*
*	0.10	92100.	*	80.00	311.	*
*	0.20	63100.	*	85.00	256.	*
*	0.50	46800.	*	90.00	201.	*
*	1.00	30900.	*	95.00	151.	*
*	2.00	17000.	*	98.00	114.	*
*	5.00	6690.	*	99.00	96.	*
*	10.00	3600.	*	99.50	82.	*
*	15.00	2530.	*	99.80	69.	*
*	20.00	2000.	*	99.90	61.	*
*	30.00	1350.	*	99.95	55.	*
*	40.00	919.	*	99.99	44.	*
*	50.00	682.	*	100.00	26.	*

-DURATION CURVE - KAW LAKE INFLOWS  
BASED ON OBSERVED VALUES - FLOW,CFS  
200000-





LEGEND - O=OBSERVED VALUE, H=HIGH OUTLIER OR HISTORIC VALUE, L=LOW OUTLIER, Z=ZERO OR MISSING, X=COMPUTED CURVE

TEST NO. 3 -- STATISTICAL ANALYSIS OF TIME SERIES DATA  
ANALYTICAL ANALYSIS OF DAILY FLOWS  
COMPUTE DURATION CURVE ALONG WITH MAXIMUM AND MINIMUM ANALYSIS

-MONTHLY SUMMARY- KAW LAKE INFLOWS

YEAR	JAN	FEB	MAR	APR	MONTHLY AND ANNUAL MEAN VALUES, FLOW,CFS											
					MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	ANNUAL			
1922	134.	212.	2584.	7176.	7254.	1541.	9611.	923.	412.	332.	1994.	610.	2752.			
1923	191.	121.	191.	275.	3144.	25982.	2368.	2669.	2551.	4135.	2527.	1572.	3797.			
1924	1043.	2035.	3240.	3924.	4377.	1151.	872.	1014.	330.	405.	392.	387.	1597.			
1925	414.	657.	454.	1012.	933.	572.	232.	815.	520.	363.	628.	392.	581.			
1926	530.	608.	583.	1226.	636.	408.	296.	664.	3276.	11545.	1298.	871.	1842.			
MEAN	463.	727.	1411.	2722.	3269.	5931.	2676.	1217.	1418.	3356.	1368.	766.	2114.			
MAX	1043.	2035.	3240.	7176.	7254.	25982.	9611.	2669.	3276.	11545.	2527.	1572.	3797.			
MIN	134.	121.	191.	275.	636.	408.	232.	664.	330.	332.	392.	387.	581.			
-STATISTICS OF THE LOGS OF VALUES GREATER THAN ZERO-																
MEAN	2.554	2.664	2.926	3.196	3.355	3.206	3.027	3.026	2.954	3.073	3.041	2.820	3.250			
STDV	0.355	0.476	0.522	0.551	0.450	0.714	0.669	0.234	0.470	0.718	0.340	0.256	0.309			
SKW	0.075	0.147	0.075	-0.233	-0.312	1.672	0.632	1.750	0.539	0.815	-0.420	0.753	-1.021			

TEST NO. 3 -- STATISTICAL ANALYSIS OF TIME SERIES DATA  
 ANALYTICAL ANALYSIS OF DAILY FLOWS  
 COMPUTE DURATION CURVE ALONG WITH MAXIMUM AND MINIMUM ANALYSIS

-MONTHLY SUMMARY- KAW LAKE INFLOWS

YEAR	JAN	FEB	MAR	APR	MAXIMUM DAILY VALUES, FLOW,CFS												ANNUAL
					MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC					
1922	275.	655.	14759.	29164.	16726.	4643.	47437.	1345.	788.	604.	8154.	756.		47437.			
1923	571.	205.	435.	1014.	15403.	110960.	3819.	5898.	6127.	11002.	5076.	1853.		110960.			
1924	1605.	3304.	6329.	16045.	24276.	1936.	2024.	5682.	1137.	990.	688.	466.		24276.			
1925	1261.	942.	518.	2380.	3884.	2032.	562.	1286.	2621.	613.	1728.	505.		3884.			
1926	718.	752.	670.	2421.	891.	751.	627.	2478.	30144.	68991.	2858.	1186.		68991.			
MEAN	886.	1172.	4542.	10205.	12236.	24064.	10894.	3338.	8163.	16440.	3701.	933		51110.			
MAX	1605.	3304.	14759.	29164.	24276.	110960.	47437.	5898.	30144.	68991.	8154.	1853.		110960.			
MIN	275.	205.	435.	1014.	891.	751.	562.	1286.	788.	604.	688.	466.		3884.			
-STATISTICS OF THE LOGS OF VALUES GREATER THAN ZERO-																	
MEAN	2.872	2.899	3.230	3.687	3.867	3.636	3.422	3.431	3.527	3.489	3.430	2.918		4.507			
STDV	0.302	0.431	0.705	0.618	0.595	0.836	0.783	0.323	0.634	0.917	0.417	0.253		0.567			
SKW	-0.502	0.181	0.720	0.415	-1.138	1.625	1.236	0.143	0.856	0.977	-0.469	0.535		-1.320			

TEST NO. 3 -- STATISTICAL ANALYSIS OF TIME SERIES DATA  
 ANALYTICAL ANALYSIS OF DAILY FLOWS  
 COMPUTE DURATION CURVE ALONG WITH MAXIMUM AND MINIMUM ANALYSIS

-MONTHLY SUMMARY- KAW LAKE INFLOWS

YEAR	JAN	FEB	MAR	APR	MINIMUM DAILY VALUES, FLOW,CFS												ANNUAL
					MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC					
1922	83.	87.	202.	1078.	2305.	911.	1088.	463.	328.	286.	587.	314.		83.			
1923	108.	95.	93.	26.	317.	359.	1702.	1457.	1014.	2100.	1604.	1411.		26.			
1924	672.	1294.	1451.	1911.	1573.	546.	395.	271.	181.	210.	242.	310.		181.			
1925	246.	286.	380.	420.	485.	236.	161.	224.	161.	224.	300.	281.		161.			
1926	331.	486.	505.	597.	350.	229.	150.	108.	92.	911.	741.	705.		92.			
MEAN	288.	450.	524.	806.	1006.	1104.	699.	505.	355.	746.	695.	604.		109.			
MAX	672.	1294.	1451.	1911.	2305.	3596.	1702.	1457.	1014.	2100.	1604.	1411.		181.			
MIN	83.	87.	93.	26.	317.	229.	150.	108.	92.	210.	242.	281.		26.			
-STATISTICS OF THE LOGS OF VALUES GREATER THAN ZERO-																	
MEAN	2.338	2.434	2.544	2.626	2.858	2.797	2.649	2.529	2.390	2.682	2.741	2.687		1.952			
STDV	0.369	0.494	0.446	0.722	0.395	0.494	0.477	0.421	0.396	0.441	0.328	0.305		0.335			
SKW	0.178	0.382	0.170	-1.575	0.579	0.970	0.237	0.724	1.003	0.919	0.453	1.111		-1.228			

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 ↓ END OF RUN ↓  
 ↓ NORMAL STOP IN STATS ↓  
 ↓ HAVE A GOOD DAY ↓  
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CLASS USE OF HEC HARRIS 1000

1. To logon

a. Enter: "Control G" ( may need to repeat )

b. In response to USER#

Enter: GP##,GP## Where: # IS THE GROUP NUMBER

2. CREATE INPUT FILE

COED MYDATA [This creates a file named MYDATA]  
NEW FILE  
E>I T1 THIS IS THE FIRST TITLE CARD [This inputs a line]  
E>I T2 THIS IS THE SECOND TITLE CARD  
E>I T3 THIS IS THE THIRD TITLE CARD

E>FREE [This enters into Free Format Input]  
E>I [This enters into Input mode]

F>J1 , , 2, , , , , 13

F>J2 1

F>

[continue to enter data]

F>\$\$\$ [This gets you out of input mode]  
E>P A [This prints the entire file]

[A file listing would be shown]

E>FS [This will put you in full screen mode]

E>FILE  
MYDATA EDITED [This will save your file MYDATA]  
OK

3. RUNHEC [This MACRO runs HEC programs, see example]

4. COED OUTDATA [This allows you to look at your output on disk]

5. SP OUTDATA [This will send OUTPUT to the printer]

6. To logoff

a. Enter: OFF

b. WAIT until both cost and computer time accounting blocks have been displayed.

c. WAIT 20 seconds more, then power down terminal.